



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

IV.—ASSOCIATION IN SUBSTITUTION AND ROTATION.

I.

The process of association between words is seen in its lowest terms in the very simple case of the repetition of a conjugation or declension: *domini* suggests *domino*; *domino*, in turn, *dominum*. So also in involuntary counting, instead of writing a given number, "fourteen," for example, we unintentionally raise it by one unit and write "fifteen." I shall not stop to apologize for the simplicity of these illustrations; they are purposely selected, in preference to anything more recondite, to bring into clearest relief the principle that nothing to be localized in the mouth or the hand is involved; the functions of the brain, and of the brain alone, are concerned.

There are, however, changes in words and in written characters that are to be attributed to local muscular resistance. In speech, to which I shall confine myself, these are manifested either in the relaxation of the closing parts, or in "reduction," as limited by Sievers, meaning the entire omission of one or more of the combined actions required to produce any given sound. Whether, however, relaxation or reduction has been the agent efficient in a change, the new sound is made in the same place, or as nearly in the same place as the resulting muscular combinations will admit. Instances are afforded by some of the spirants arising from close mutes. But where a back palatal is displaced by a close labial or front palatal, something more than mere muscular resistance is involved. To be sure, the new sound may be easier to enunciate, but so might also a new word, from an altogether different root, be easier than an older word displaced by it. Compare, for instance, ἀδελφί, with the Indogermanic **swésor* in the Greek mouth. The exchange of words facilitates communication, but is not due to phonetic law.

The perhaps too simple illustrations "*domini*" and "fourteen" were selected in order to present in the strongest possible light the difference between the processes carried on altogether in the nervous centres¹ and those to be attributed, in part, to the mouth.

¹ I have not undertaken to distinguish between "ganglionic" and other nervous functions.

But there are, furthermore, evidences of similar associations between single phonetic elements, or groups of phonetic elements, as such, in and by themselves, without being influenced by the remaining sounds, or the significance, of the word in which they occur.

I am not referring to "analogy"; the relation of this class of associations to analogy associations will be discussed farther on. It is necessary to proceed with extreme caution in framing any hypothesis as to the more intimate physiology of this class of associations; in fact, in the present condition of psychology and its handmaiden, cerebral physiology, it is hardly possible even to state a question in unexceptionable terms. If, however, we should suppose single brain or nerve cells, or perhaps molecules, motory and sensor, appropriated to the perception, registration and origination of each phonetic element, something after the fashion of a phonographic record, we should possess a provisional means of excluding considerations that do not belong to the study of this class of associations, and be able to reason in such a manner as to secure mutual understanding. This is all: let no one do me the injustice of attributing more than a merely illustrative or metaphorical value to the above. The hypothesis implied in it seems clearest on first inspection; the more closely it is examined, the more improbable will it appear, and the more complex will seem the anatomical conditions which it, with all its corollaries, demands.

The records of the symptoms of aphasic cases do, however, warrant the assumption of some such specialization in function, if not of specialized cells. In the first place, the whole group of faculties relating to spoken and written language has been, and with fair probability, referred to a particular convolution. Pathologists describe also separate affections of the faculty of comprehending the meaning of words heard (although the sound may seem as "loud" as before), that of reading visible word symbols, of writing, and of uttering significant speech, all without any local affection, such as deafness in the ear or paralysis in the mouth or arm.

The pathological analysis goes farther. An aphasic person may associate the notion of articulate speech merely with one word or phrase repeated to express every idea; he may associate the word "yes" with positive (not merely affirmative) ideas, "no" with negative ideas, and "yes-no" with doubtful ideas; he may connect the conception of any number with one single numeral, such

as "*trois*."¹ All of these cases are to our purpose, inasmuch as they show how remote may be the associations controlling the speech, and without local affections.

Of vast significance to our inquiry are those cases where one sound displaces another, throughout the vocabulary. One aphasic German always substituted a *z* for an *f*; he would ask for "*Kazzee*" meaning *Kaffee*.² Such cases are comparatively rare, since the alphabet is so limited. But they prove the possibility of a substitution of one sound for another, such as can in no manner be attributed to analogy influence or to muscular resistance. Probably the same thing is seen in the aphasic substitution of spirants for close mutes ("aphasic," not "aphonic"; in aphonic conditions the effect of muscular resistance is intensified).

In the normal conditions of the brain, the plainest instance of such association of sounds, without reference to their phonetic environment, is seen in the manner in which, after learning the proper pronunciation, the habit of using a foreign sound is acquired. The process should be carefully studied in some of its apparently (but only apparently) trivial details. The beginner commonly pronounces *ü* as *ea* in "tea"; after acquiring the exact utterance, he will still pronounce *ea*, but the correct sound is present in consciousness, and is at once substituted; after a time *ea* rises before the consciousness, but, if not uttered, fades away little by little until *ü* is established. An instructive variation in the course of the process occurs when *ü* is first pronounced, but is mechanically replaced by its satellite *ea*, then again replaced by *ü*. (In aphasic cases there may or may not be consciousness of the errors made; the particular person using *trois* for "four" would correct his words by holding up four fingers.)

¹ It may be suggested to medical writers that aphasic speech symptoms should never be translated. The phonetic elements of the words used may be important.

² The organic *z*'s were, I presume, left unaltered, although none of the various reports of the case that I have seen touched this question. Medical men are, for many reasons, far better observers of aphasic symptoms than philologists or psychologists could pretend to be; no others, for example, could exclude aphonia. Yet a little assistance from specialists in the two other fields mentioned would often improve both their studies of these cases and their reports. For instance, the report on which I mainly rely for the above spelled *Kazzee* with one *e*. Had it not been for the context, one would have taken it for a simple confusion of words,

II.

Among the most remarkable phenomena in the phonetic systems of the Indogermanic languages are the cases of the convergence of different primitive sounds in one. Some of these are, in the main, accidental results of changes caused in each, independently of the other, by muscular resistance; for instance, the convergence in the Greek rough breathing of primitive *ǵ*- and *s*-, and of various aspirates in the Sanskrit *h*. The striving after ease in pronunciation acts independently in modifying each sound and nearly completes these reductions. The reason of the qualifications, "in the main" and "nearly," will appear farther on.

But there are cases of convergence which admit of no such explanation. Such are the falling together of primitive *a*, *e*, and *o* in Aryan *a*, of *a* and *o* in primitive Germanic *a* contrasted with the convergence of the same sounds in Balto-Slavic *o*, and of *ā* and *ō* in primitive Germanic *ō*; of *au* and *ou* in primitive Germanic *au*, etc. These cases are quite as difficult to explain as the rotation of the mutes, and demand, just as imperatively, collective treatment. It is not improbable that whatever partial or complete solution is found for the one will give the hint leading to the proper solution of the other.

Between these cases of vowel convergence and rotations on the one hand, and changes clearly due to muscular resistance on the other, it is possible to draw a very clear line, although all are at present put together under the vague or at least the too wide term "phonetic law." In drawing this line, I believe that we shall attain to such an understanding both of the phenomena of convergence and of rotation as to reduce the difficulties attending upon them to the single, generally unanswerable question common to all historical questions, namely, the determination of the particular, in all probability very trivial starting points. No one, for example, pretends to say just why a close mute begins, at one particular period rather than another, to become a spirant; the process itself, once begun, is, however, clear enough: if the questions connected with rotation can be reduced to like simple terms, the special difficulty is conquered.

The convergence of the above-mentioned vowels is not, like the falling together in Greek of Indogermanic *s*- and *ǵ*-, the secondary result of changes naturally due to the factors involved in the pronunciation of each by itself. For if, on account of the Balto-Slavic, it is to be assumed that Indogermanic *a* naturally

fell in with *o*, what is to be said of primitive Germanic *a*? Or if, on account of the Aryan, it is to be assumed that primitive *o* and *e* were sounds of such quality as naturally to fall in with *a*, we may as well discard the characters *a*, *e*, and *o* altogether and substitute some new sign in its place, as—so at any rate it appears to the unregenerate mind—has come finally to be done in the case of *æ*. To be sure, something not altogether unlike this was Schleicher's system, and the proofs for primitive *o* want much of the strength of the evidence for primitive *e*, and then there may have been many indeterminate vowels in the primitive system, and then some of these vowel changes may yet come to be classed under "analogy" changes, and so forth, but all such considerations would compel the rewriting of our comparative grammars; they are not to be reconciled with prevailing canons.

I propose for this type of changes the term "substitution," a word in much more frequent use some fifteen years ago than at present, but, of necessity, without sharply defined technical limitation. I do not intend, however, to use it as a mere algebraic expression for altogether unknown conditions, but believe that the data given in the first part of this paper are sufficient to afford means of comprehending so much of the physiology of the change as will enable the working etymologist to use it with a fair degree of precision.

III.

An association is formed (see IV) between the old sounds, in and by themselves, without reference to the words in which they occur, accompanied by a tendency to reduce them to one (see IV), the process being identical, except in so far as concerns the constant presence of the element of conscious intention, with that described above in the case of *ii*. That the replacing sound, e. g. the Aryan *a*, should have precisely the same quality as any one of the older sounds, e. g. the primitive *a*, is unessential: it may be more open or more close, perhaps much more close.

This is not an analogy process. Analogy changes are due to some real or fancied bond between words or classes of words, as is most evident in its action in altering inflections and the form of the numerals.

The term "phonetic law" is used to include all changes not due to the action of analogy, and so includes "substitution" as above defined. It is said to be a "phonetic law" that *s*- should become

h- in Greek, and equally a phonetic law that *e* should become Aryan *a*. The term is, as said above, too comprehensive, and it is, no doubt, to this defect that some part of the differences of opinion in regard to its range is due. We should at least separate changes due to muscular resistance from those comprised above under "substitution," whatever name may be preferred for the latter. Since these may displace open by closer and closer by open sounds, and since the fact that every word in the vocabulary is affected will preclude the assumption of the influence of adjacent sounds, it cannot be supposed that muscular resistance is the factor at work.

To be sure, the term "phonetic law" ought, in itself, to include everything, "analogy" comprised, since it certainly is a law affecting the phonesis that one word should influence the phonetic form of another. But an exceedingly useful though arbitrary distinction has been made, and it is this separation, as a clear and distinct working conception rather than a dim presentiment, that has marked much of the advance since Schleicher. To conjecture that there is a western continent, and to man ships to sail to its shores, are by no means the same thing. It will be an equal gain in clearness to set apart, under whatever term may seem best, the phenomena of substitution, and, instead of two factors, to reason with three.

The separation vastly simplifies the problem of the cause of the differences in the phonetic peculiarities of different tongues descending from the same mother-speech. The distinct conception, as a practicably applicable instrument in the study of etymologies, of analogy, has done much in this direction. And "substitution" has this feature in common with analogy, and in distinct opposition to muscular resistance, namely, it depends upon the previous total contents of the vocabulary, and not upon the conditions of the mouth.

Again, much light is thrown upon the equally obscure reasons for the time limitation set to the operation of certain tendencies to the mutation of sounds. If a sound was difficult at one period, why not at another? But substitution does not attribute the mutation to the quality of the single sound in itself. Sounds are liable to this form of change only when associated with others, just as epenthesis and involuntary counting can occur only when the mind anticipates the following sound or the succeeding numeral. When the process is completed, so that the contrasting

sounds have been reduced to one (or so that rotation has been perfected), the impulse to change must, of course, cease to operate. After that time the displaced sound may be reintroduced, in new derivatives or in analogy formations, and left untouched.

There is one other important particular in which substitution changes are parallel to analogy changes. A substitution may be immediate; a *b* may at once displace a back palatal; such a transfer, if explained only by muscular resistance, requires the assumption of a very insecure series of transition forms, and even then the last step is inexplicable. It would seem as if very few mutations could be attributed wholly to the mouth. The various aspirates which in Sanskrit were, under certain circumstances, reduced to *h*, had different clang-tints. There must at first have been as many forms of *h*, so that the convergence is only in part due to muscular resistance. Whether the ear, confusing these utterances, or some process of "substitution" was operative in reducing them to one, it is not easy to say.

The rotation of the mutes is the result of a very complex series of substitution processes. In rotation, the action of analogy has never been definitely suspected, since there is no reason for imputing even its inception to the possible influence of any class of words. It is decidedly not, taken as a whole, to be attributed to muscular resistance, since with the exception of the development of spirantic utterance, the scheme of sounds remains the same. That the position relative to the primitive accent (Verner's Law) was of importance does not alter the case; the exceptional treatment of sounds just after the accented vowel proves, on any basis of reasoning, some difference in quality. That certain combinations, such as *st*, exempt the mute from rotation constitutes no greater difficulty than before; there is no reason for supposing that the association of substitution is more potent in passing every limit set by the greater facility with which certain combinations can be pronounced, than the association of analogy, and the influence of muscular resistance, in altering certain single sounds, have proved themselves to be. Analogy and muscular resistance and substitution act as checks one upon the other. The process is, as already remarked, of a very complex character, but the complexity is much less evident if studied with careful reference to the chronological succession of the various changes involved.

IV.

It will be sufficient if the considerations adduced above have thrown any light upon the physiology of the various changes and conditions discussed. As already said, neither in the study of analogy operation in general, nor, and still less, in the investigation of the mutations due to phonetic law, are etymologists wont to regard it as incumbent upon them to seek for the reasons why one series of mutations is commenced in one language rather than another entered upon by some other tongue derived from the same primitive stock. In this respect all historical sciences are on the same footing.

The phonetic constitution, however, finally given to any particular tongue is one of the manifestations of the art tendencies of the people who speak it; like the special artistic treatment that the same people may give to visible forms and to color, it is a part of the national genius. Very probably this will seem to some readers like a virtual and rhetorical evasion of the question, but such is not its import. I mean that the causes leading to the artistic refinement, or to the contrary treatment, of a speech are of a kind having nothing whatever to do with anything recognizable as a part of phonetic forces, and not to be found in any of the data given by the analysis of the phonetic elements of a tongue.

The relation between phonetic science and the study of the special art tendencies of any particular people is the same as that recognized to exist between general linguistics and the psychology of a particular people. The national or popular psychology determines how the individual conceptions shall be grouped and indicated by separate words; linguistic science, while it may, as a preliminary, inspect this distribution, is distinctly unable to draw up the formulæ in accordance with which the distribution has been made. With the outlines of this psychology the student of linguistics should be familiar, just as the entomologist must know the flora of the field in which he works; yet there is a clear line between entomology and botany, and the line between phonetic science and the art tendencies of a nation is quite as distinct. The mental endowments of the Greek limited its compounds, as its plastic art, within the bounds set by moderation, good taste and beauty; the Hindoo cared for none of these things; he produced in all departments a cumbrous and artistically defective style, long lumbering compounds, many legged, armed and headed statues.

The starting points must have been of such a trivial character sometimes, even the whim of an individual, the mistake of a child, or the affected manner of some social circle! We have a right to ask of the geologist that he shall detect the erosion to which some deep valley may owe its existence; we have no right to demand that he shall indicate the particular fallen tree, or even the minute quartz crystal whose resistance originally determined the precise direction of the trickling rill that began the work.

Kindred sounds, or kindred groups, *eu*, *ou*, and *au*, for instance, are associated with each other. The discriminating and refining impulses of a people which kept optatives and subjunctives apart, or perhaps first assigned to each a distinct function, and in its particles refined upon all kinds of adverbial qualifications, would seek to preserve the difference between these diphthongs, although it might relinquish the monotonous element (*u*) that they have in common. Other less gifted peoples would permit the action of assimilation, or else of substitution, to drive part or all of these diphthongs out of the tongue.

This last paragraph does not apply to rotation. In rotations, as in many other changes, such as the fluctuations in accent, and the interchanges between *i* and *î*, and *u* and *û*, in the course of Indo-germanic history, Techmer's simple imputation of many mutations to the influence of "fashion" has very much to commend it. The word seems derogatory, but this depends rather upon the details to which it is applied than upon anything in the conception itself. It is a term under which we may collect the tendencies which, not merely in matters of dress, but also in painting, in architecture, in the forms chosen for literary compositions, in the figures of speech in vogue, and finally in phonesis, lead the community, in its search after variety, to adopt the variations occurring in the speech of individuals. It may not in any department lead to advance towards aesthetic perfection, there may be retrogression, and yet in language it is one of the manifestations of a disposition to take pleasure in change for the sake of change, which is certainly a part of the art tendency. We weary of the old; the cultivated intellect, using a tongue that has become subjected to fixed rule, finds relief and delight in varying the rhetorical combinations of prose or verse; the uncultivated mind, free from the restrictions set by the grammarian or lexicographer, and having no other resource, will more easily admit to general use many of the sporadic modifications in the speech of every-day life. But

such changes are not confined to uncultivated races; the fluctuations in the English vowel system during the last three centuries clearly indicate the influence of "fashion." These changes are easily understood if studied, not as belonging to the sphere of phonetic law, with its inevitable implication of mechanical causes seated in the mouth, but to the activity of association operating as above indicated.

The limits of this paper do not permit me to pursue the subject into farther detail and to examine such matters as labialism, epenthesis, true metathesis, and so forth, still less to attempt to point out the precise range of the action of each of the three factors that have been proposed. It is, however, as well to add that the above considerations do not touch upon the question of the invariability of phonetic law taken in its widest sense. If so disposed, we may still suppose that a substitution process, once begun, pursues an unswerving course until the assimilation is completed. In so far as the theory advanced finds a difference between the circumstances prevailing at the period of the modification of a sound and those prevailing later, when the same sound is reintroduced by analogy or in new derivatives, it undoubtedly strengthens the hands of those engaged in supporting the doctrine of invariable law.

MORTON W. EASTON.